

## CASE STUDIES

### Optimizing Biogas Production with Primary Sludge

Saulekilen Wastewater Treatment Plant  
Arendal, Norway

#### Project Background

The Saulekilen Wastewater Treatment Plant, located in the town of Arendal, in Southern Norway, treats a typical municipal mix of wastewater from households and small to medium-sized industry. The Plant was looking to upgrade their facility to almost double treatment capacity from 45,000 p.e. to 80,000 p.e. In order to be considered for the upgrade, potential equipment needed to be:

- Compact, to fit inside the existing building
- Capable of optimizing sludge production to generate more biogas
- Cost-effective compared to alternatives
- A proven, reliable technology
- Easy-to-operate

#### Equipment Selection

To meet the new capacity requirement of 80,000 p.e., Knut Berg-Larsen (Technical Director of Arendal Municipality) and his team worked with Biowater Technology to install biological filters and six SFK600 Salsnes Filter units for primary solids separation.

The Salsnes Filter system removes particles from incoming wastewater to reduce the solids loading on downstream processes. It also performs sludge thickening and dewatering integrated within the unit.

#### Results of the Upgrade

##### More Biogas Production

Thickened and dewatered sludge from the Salsnes Filter system is pumped into on-site storage, stabilized, and then sent to anaerobic digesters to produce biogas. No chemicals are used in the solids separation process, so this "virgin sludge" has a higher energy output for gas production compared to secondary sludge digested from conventional secondary treatment.

Biogas produced from this process is used to generate electricity to run the Plant, quickly giving back returns on the original investment cost.



#### System Parameters

Salsnes Filter: SFK:600

Type of Treatment: Primary Wastewater Treatment

P.E.: 80,000

Influent TSS: 234 mg/L

Effluent TSS: 95 mg/L

Particle Size: 0 - 100 mm

Maximum Flow Rate: 589 L/s (13.4 MGD)

Dewatered Sludge: 25% Total Solids

"The methane we produce is used for internal energy production, reducing such costs and contributing to a smaller carbon footprint."

Knut Berg-Larsen



SFK600 Salsnes Filter

## More Available Phosphorous

There is another benefit of chemical-free Salsnes Filter sludge over conventional secondary sludge. According to Berg-Larsen, because there are no chemicals (i.e. flocculants) in the sludge, it offers a higher nutritional value for plants when used as a fertilizer for agriculture. Flocculants have a negative impact on crops, as they can inhibit phosphorous release thereby reducing its availability to crops.

Phosphorous is a limited global resource, steadily increasing in price, so primary Salsnes Filter sludge can command a high market value. "It has been simple to find a market for this sludge" says Berg-Larsen.

## Shorter Construction Time

The County Environment Office approved installation of the Salsnes Filter system while the existing plant continued to operate. This allowed the Plant to avoid installing other special equipment to operate during construction and helped accelerate the upgrade process.

## Using Existing Infrastructure

The Salsnes Filter system is installed on top of the biological filters, which has allowed this new equipment to fit inside existing buildings. Former basins are now available for new bioreactors and clarification of biological solids by dissolved air flotation.

Berg-Larsen says, "We chose this design because it was the only way we could fit the new plant inside our existing buildings. The savings have been considerable on different levels, and the plant has been less expensive to operate".

It's estimated that this compact layout has reduced overall investment costs by NOK 17 million (~ \$2 million USD). This amounts to an upgrade that has cost approximately half that of a conventional treatment plant.

"With this design, we built the treatment plant NOK 17 million cheaper than with a traditional layout."

"Even if we were to build a new plant, we would have chosen this process. The alternatives that we know of would come out more costly, and this also goes for operational costs."

## Knut Berg-Larsen

Technical Director of Arendal Municipality, Norway

